REMARKS/ARGUMENTS

The amendments and remarks hereto attend to all outstanding issues in the pending office action of 23 February 2005. Claims 1-37 are pending in this application. Claims 1-36 are amended. Claim 37 is new.

In the Drawings

The drawings are amended as follows. FIG. 1 is renumbered as FIG. 1A. New FIG. 1B illustrates a refractive element as specified in claim 11. New FIG. 1C illustrates a diffractive element as specified in claim 12. New FIG. 1D illustrates a single optical element as specified in claim 13; it has one or both of refractive and diffractive qualities as in claim 14 and one or more optical surfaces as in claim 15, the surfaces including one diffractive surface as specified in claim 17. New FIG. 1E illustrates a single optical element having one reflective surface as in claim 16. The matter contained in FIG. 1B, FIG. 1C, FIG. 1D and FIG. 1E is supported by the specification as filed in paragraph **[0033]** and claims 11 - 17. No new matter is added to the application through the drawing amendments.

In the Specification

Paragraph **[0002]** of the specification is amended to correct the filing date of provisional application serial number 60/417,332, from which the instant application claims priority. This correction is consistent with USPTO records, and adds no new matter to the specification.

Paragraph **[0017]** of the specification is amended to renumber FIG. 1 as FIG. 1A, and paragraphs **[0017.1]** through **[0017.4]** are added to provide Brief Descriptions of FIG. 1B, FIG. 1C, FIG. 1D and FIG. 1E, for consistency with the drawing amendments submitted herewith.

Paragraph **[0033]** of the specification is amended to change the words "final image plane" to "image plane" to correct an obvious error, there being no structure or location in the application as filed that is identified as a "final image plane." Paragraph **[0033]** is also amended to change the word "image" to "intermediate image" for clarity. This amendment is supported by paragraph **[0034]**; an

AMENDMENTS TO THE DRAWINGS

The attached sheets of drawings include changes to previous FIG. 1, now FIG. 1A, and new FIG. 1B, FIG. 1C, FIG. 1D and FIG. 1E. The first sheet (marked "Replacement Sheet") replaces the original sheet including FIG. 1. The second sheet (marked "New Sheet") includes new FIG. 1B, FIG. 1C, FIG. 1D and FIG. 1E.

ATTACHMENTS: REPLACEMENT SHEETS

A replacement sheet and a new sheet are pages 29 and 30 of this paper.

"intermediate image 24" and a "final image 34" are both defined in paragraph **[0034]**, but a detector is required to capture the "intermediate image."

Paragraph **[0034]** of the specification is amended to point out that phase plate 16 is an example of an SDO element. This amendment is supported by the specification as filed at paragraph **[0033]** that states: "In one embodiment, the SDO element is a specially designed phase plate."

Paragraph **[0034.1]** is added to provide Detailed Descriptions of newly added FIG. 1B, FIG. 1C, FIG. 1D and FIG. 1E, for consistency with the drawing amendment submitted herewith. The matter disclosed in paragraph **[0034.1]** is supported by the specification as filed in paragraph **[0033]** and claims 11 - 17.

Paragraph **[0039]** has been amended to correctly identify item 24 as "intermediate image 24." This amendment is supported in the specification as filed at, for example, FIG. 1 and paragraphs **[0034], [0035] and [0036]**, which refer to item 24 as "intermediate image 24" and/or "image 24."

The Abstract is amended to correspond with paragraph **[0033]**, discussed above.

No new matter is added to the application through any of the specification amendments.

In the Claims

Claim 1 is amended to clarify that what is claimed is "an imaging system," to recite "an object" to provide antecedent basis, to clarify that a final image is of "the object" and to effect grammatical changes. These amendments are supported by paragraphs **[0010]** and **[0012]** and by claim 1 as originally filed.

Claims 2-4 are amended to effect grammatical changes for consistency with claim 1; claim 2 is amended to clarify that the specially designed optical element is disposed between the object and the intermediate image.

Claim 5 is amended to effect a grammatical change for consistency with claim 1, as well as to insert the word "the" to correct a grammatical error.

Claim 6 is amended to eliminate the term "predetermined location" and to clarify that "the specially designed optical elements are disposed at the image of the aperture stop," to avoid confusion as to whether the image of the aperture stop is the location of the aperture stop, as well as to effect a grammatical change for consistency with claims 1 and 2, from which claim 6 depends.

Claims 7-9 are amended to effect a minor grammatical change.

Claim 10 is amended to effect a grammatical change for consistency with amended claim 1.

Claims 11-12 are amended to effect a minor grammatical change.

Claim 13 is amended to effect a grammatical change for consistency with amended claim 1.

Claim 14 is amended to effect a minor grammatical change.

Claim 15 is amended to depend from claim 1 and to effect a minor grammatical change.

Claims 16 and 17 are amended to depend from claim 15, to provide antecedent support for the term "optical surface" used therein.

Claims 18 and 19 are amended to effect a number of minor grammatical changes, including those for consistency with amended claim 1.

Claim 20 is amended to clarify that the first depth of field is not formed by the optical arrangement but is a characteristic exhibited by the optical arrangement. The amendment to claim 20 find support in claim 20 as originally filed.

Claim 21 is amended to place the claim in Jepson format, to recite "an object" to provide antecedent basis, to change the words "digital processing arrangement" to "digital processor" for proper antecedent basis, and to omit the limitations "to an image plane," "at an intermediate plane" and "at the image plane." The amendments to claim 21 find support in paragraphs **[0010]** and **[0012]** of the specification, and in claim 21 as originally filed.

Claim 22 is amended to clarify that an intermediate image of the object is formed by directing light from the object through at least one optical element exhibiting a first depth of field, that a specially designed optical element perturbs a phase function of the light, and that that the optical element and the specially designed optical element combined yield a second depth of field. The limitation "at an intermediate plane" is removed. The amendment to claim 22 find support in claim 22 as originally filed.

Claim 23-32 are amended to effect minor grammatical changes, and claims 24 - 27 are amended to insert the words "specially designed" to distinguish one "optical element" from other "optical elements" in the same claim.

Claim 33 is amended to spell out the words that are abbreviated to form the acronym "PSF" at its first use.

Claim 34 is amended to clarify that the intermediate image is produced so as to include a plurality of frequency components with amplitude characteristics and, furthermore, the perturbing includes attenuating the amplitude characteristics of certain ones of the plurality of frequency components while the digital processing includes amplifying the amplitude characteristics. The amendment to claim 34 finds support in claim 34 as originally filed.

Similarly, claim 35 is amended to clarify that the intermediate image is produced so as to include a plurality of frequency components with phase characteristics and, furthermore, the perturbing includes modifying the phase characteristics of certain ones of the plurality of frequency components while the digital processing includes correcting the modified phase characteristics. The amendment to claim 35 finds support in claim 35 as originally filed.

Claim 36 is amended to clarify that what is claimed is "an imaging system," to recite "an object" to provide antecedent basis and to omit the limitations "to an image plane" and "at an intermediate plane." The amendment to claim 36 finds support in claim 36 as originally filed.

Support for each of the claim amendments is found in the corresponding claim as filed. No new matter is added to the application through any of the claim amendments.

New claim 37 has been added that includes limitations of original claim 33 as well as claims 22 and 32, from which claim 33 depends. The features of new claim 37 such as, for example, "an angle between the in-focus PSF and the out-of-focus PSF that is maximized in Hilbert space" are believed to be patentable over art of record. Therefore, in accordance with the Examiner's indication under "Allowable

Subject Matter" in the current Office Action, it is respectfully submitted that new claim 37 overcomes the art of record.

Response to Office Action

The following paragraphs follow the order of the paragraphs in the Office Action mailed 23 February 2005 in this application.

Drawings

The drawings in this application are objected to under 37 CFR §1.83(a), and the Examiner requires that the drawings show the optical arrangement and the one or more specially designed optical elements as recited in claim 1 and the variants of the specially designed optical elements recited in claims 11-17. Applicant notes that FIG. 1A shows an optical arrangement having an object 11, a lens 14 and an intermediate image 24, and a phase plate 16 which is an example of a specially designed optical element. New FIG. 1B is added to illustrate a refractive element 26 as in claim 11. New FIG. 1C is added to illustrate a diffractive element 27 as in claim 12. New FIG. 1D is added to illustrate a single optical element 28 as in claim 13 that has one or both of refractive and diffractive qualities as in claim 14 and one or more optical surfaces 29(1), 29(2) as in claim 15, with surfaces 29(1), 29(2) including one diffractive surface as in claim 17. New FIG. 1E is added to illustrate a single optical element 32 having one reflective surface 33 as specified in claim 16. Accordingly, Applicant requests reconsideration and withdrawal of the objection to the drawings under 37 CFR §1.83(a).

Claim Objections

Claims 1-20 are objected to because in claim 1, it is allegedly unclear whether the "one or more specially designed optical components" are part of "the optical arrangement" or a separate element, with claims 2-20 inheriting the same issue. Applicant disagrees and traverses this objection. We assume the Examiner meant the specially designed optical "elements," as opposed to "components." The language of amended claim 1 makes it clear that the "at least one specially designed optical element" is separate from "the optical arrangement." For example, claim 1 includes "an optical arrangement for forming an intermediate image of the object ... with a first value of axial resolution" and "at least one specially designed optical element configured to cooperate with the optical arrangement and the digital processor to define a second value of axial resolution…" Thus, (1) the specially designed optical element must "cooperate with" the optical arrangement (therefore, they are not the same thing); also (2) the optical arrangement forms the intermediate image "with a first value of axial resolution" but when the specially designed optical element cooperates with the optical arrangement and the digital processor, a "second value of axial resolution that is greater than the first value" is defined. Again, the specially designed optical element produces a different result than the optical arrangement alone when the two work together, so they are not the same thing. For the reasons given, Applicant believes that amended claim 1 is clear, and requests reconsideration and withdrawal of the objection to claim 1, as amended.

The Examiner has required that the term "PSF" be spelled out in claim 33. Applicant has amended claim 33 to spell out the words that are abbreviated to form the acronym "PSF" at its first use, and accordingly requests withdrawal of the objection to claim 33.

Claim Rejections – 35 U.S.C. §102

Claims 1-7, 9-15, 17-30, 32 and 34-36 stand rejected as being anticipated by U.S. Patent No. 6,097,856 ("Hammond"). Applicant respectfully disagrees. To anticipate a claim, the reference must teach every element of the claim and "the identical invention must be shown in as complete detail as is contained in the … claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California,* 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.,* 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989).

Applicants' amended claim 1 recites the following elements:

> (1) an optical arrangement for forming an intermediate image of an object with a first value of axial resolution;
>
> (2) a digital processor configured for processing the intermediate image to form a final image of the object; and
>
> (3) at least one specially designed optical element configured to cooperate with the optical arrangement and the digital processor to define a second value of axial resolution that is greater than the first value.

The Examiner cites a list of teachings within Hammond, summarized by "Although the prior art does not specifically disclose, the claimed axial resolution improvement or reduction in depth of field, this is seen as an inherent teaching of the system since the system reduces the amount of out of focus error over a range of distances." Office Action, page 4. We disagree. Applicant respectfully points out that reducing "out of focus error" corresponds to a second "value of axial resolution" that is less than the first value. Increasing axial resolution, (e.g., a "second value of axial resolution that is greater," as required by claim 1) corresponds to generating images that are resolved only within a smaller axial range; that is, with reduced depth of field. The intended meaning of "axial resolution" is clear, for example, in the specification as filed at paragraphs **[0009]**, **[0010]** and **[0065]**.

Hammond on the other hand discloses increasing depth of field, which corresponds to decreasing axial resolution: "phase mask 16… causes the OTF of the imaging system to remain approximately constant over some range of distances from the in-focus position." Hammond, col. 5, line 65 through col. 6, line 2. The "range of distances" corresponds to increased depth of field, as compared to the "in-focus position." Therefore, Hammond does not disclose, at least, element (3) of claim 1: "at least one specially designed optical element configured to cooperate with the optical arrangement and the digital processor to define a second value of axial resolution that is greater than the first value" as recited in claim 1.

Additionally, we note that certain passages of Hammond (such as, for example, col. 5 line 65 – col. 7 line 49, cited by the Examiner) relating to the use of a phase mask in the imaging system are essentially paraphrased from U.S. Pat. No. 5,478,371 to Cathey et al. (hereinafter, the " '371 patent") and, consequently, it is respectfully submitted that the description relating to the use of the phase mask in these passages does not constitute a description of an invention of Hammond. Furthermore, the '371 patent specifically discloses the *extension* of the depth of field of an optical field, in contrast to the *reduction* of the depth of field, as recited in claim 1.

Hammond thus cannot anticipate claim 1, and we therefore request reconsideration and withdrawal of the rejection of claim 1.

Claims 2-7, 9-15 and 17-20 depend from claim 1 and benefit from like arguments; reconsideration and withdrawal of the rejection of claims 2-7, 9-15 and 17-20 is also requested. However, there are other reasons for patentability of claims 2-7, 9-15 and 17-20. For example, each of claims 2-7, 9-15 and 17-19 places additional limitations on the specially designed optical elements defined in claim 1; since this element is missing in Hammond as per the above argument, none of these additional limitations are present in Hammond.

For example, claim 4 as amended recites "wherein the specially designed optical element is disposed at the image of the exit pupil," but Hammond does not disclose or suggest an image of an exit pupil, and thereby certainly does not disclose disposing anything at such an image. The Examiner cites a passage within Hammond: "Ideally the optical system would be designed with both the amplitude mask and the phase mask placed at or near one of the optical system principal planes. It is also desirable that the optical system be designed with the exit pupil at or near one of the principal planes. The amplitude mask may take..." Hammond, col. 3, lines 35-39. Hammond's passage merely discloses that certain components be designed at or near an exit pupil; it does not disclose an "image of the exit pupil."

Claim 5, as amended, recites "wherein the specially designed optical element is disposed adjacent to the aperture stop" - but Hammond does not disclose such placement of any optical elements. The Examiner cites a lengthy passage within Hammond that includes, "In the event that the amplitude mask alone defines the aperture stop of the optical assembly, as may be the case when the transmittance of the mask is made to equal zero before its physical boundaries are reached, ..." Hammond, col. 12, lines 31-34. This passage of Hammond merely discloses that an amplitude mask can form an aperture stop, but it does not disclose "the specially designed optical element is disposed adjacent to the aperture stop."

Claim 6, as amended, recites "wherein the optical arrangement forms an aperture stop and an image of said aperture stop, and wherein the specially designed optical element is disposed at the image of the aperture stop" - but Hammond does not even mention an image of an aperture stop. The Examiner cites the same passage of Hammond that was cited with respect to claim 5, wherein Hammond describes an amplitude mask defining an aperture stop itself, but not an image of the aperture stop.

Claim 7, as amended, recites "wherein the specially design optical element includes a random phase plate," and amended claim 9 recites "wherein the specially design optical element includes a phase grating." The Examiner cites another lengthy passage within Hammond that includes "an incoherent illumination source 21, an optical assembly 20 having a lens or set of lenses 22, a phase mask 24 and an amplitude mask 26" as well as "an image sensor 30" and "a DSP 40." Hammond, col. 6, lines 46-48, 53 and 59. It is respectfully submitted that the art of record does not teach, disclose or suggest in any way the use of a "random phase plate" or a "phase grating" included in the specially designed optical element.

Claim 10, as amended, recites "wherein the specially designed optical elements is configured to provide a series of sinusoidal functions for modifying a phase function of electromagnetic energy forming the intermediate image." The Examiner again cites Hammond at col. 6, lines 43-64 as teaching this limitation (quoting the claim 10 element). But here, Hammond discloses "an amplitude mask 26 which preferably, although not necessarily, has a Gaussian transmission profile." Hammond, col. 6, lines 48-49. As is well known in the art, a Gaussian profile is not a "sinusoidal function," much less a "series of sinusoidal functions." Applicants respectfully submit that the art of record does not disclose anything "configured to form a series of sinusoidal functions modifying a phase function of electromagnetic energy forming the intermediate image."

Amended claim 12 recites "wherein the specially designed optical elements includes at least one diffractive element," and amended claim 17 requires "at least one optical surfaces [of a single optical element, as in claim 13] includes at least one diffractive surface." In a rejection of claims 11-15, 17, 28 and 29, the Examiner cites a very lengthy passage of Hammond: "column 6, lines 43-67 and column 7, lines 1-67 and column 8, lines 1-." Office Action, page 5. Even assuming this citation extends to the end of column 8, Hammond does not disclose - within this passage or anywhere else - a "diffractive element," a "diffractive surface" or anything that can be construed as such.

Claim 20 recites the "specially designed optical element and the digital processor are configured to cooperate to yield a second depth of field that is less than the first depth of field." The Examiner states: "Although the prior art does not specifically disclose, the claimed reduction in depth of field, this is seen as an inherent teaching of the system since the system reduces the amount of out of focus error over a range of distances." Office Action, page 6. Again, as noted with respect to claim 1, the teachings in Hammond are specifically geared toward increasing the depth of field, i.e., forming a second depth of field that is greater than a first depth of field. Hammond does not disclose "specially designed optical element and the digital processor are configured to cooperate to yield a second depth of field that is less than the first depth of field."

For at least the reasons cited above, Applicants request reconsideration and withdrawal of the rejection of claims 1-7 and 9-20 as anticipated by Hammond.

Applicants' claim 21 recites the following elements in an imaging system of the type having an optical arrangement configured to form an intermediate image of an object with a first depth of field, an improvement comprising:

(1) a digital processor configured for processing the intermediate image to form a final image of the object;-and

(2) an optical element configured for cooperating with the optical arrangement and the digital processor such that the combination of said optical arrangement, digital processor and optical element yields a second depth of field that is less than the first depth of field.

The Examiner cites the same rationale with respect to claim 21 as for claim 1. Again, as noted with respect to claim 1, Hammond discloses increasing depth of field. Hammond does not disclose "an optical element configured for cooperating with the optical arrangement and the digital processor such that the combination of said optical arrangement, digital processor and optical element yields a second depth of field that is less than the first depth of field." Since element (2) of claim 21 is not present, at least, Hammond does not anticipate claim 21. Applicant therefore requests reconsideration and withdrawal of the rejection of claim 21.

Applicants' claim 22, as amended, recites the following step elements:

(1) forming an intermediate image of the object by directing light from said object through at least one optical element exhibiting a first depth of field;

(2) perturbing a phase function of said light forming the intermediate image using a specially designed optical element; and

(3) digitally processing the intermediate image to form a final image such that the optical element and the specially designed optical element combined yield a second depth of field that is less than the first depth of field.

The Examiner cites the same rationale with respect to claim 22 as for claims 1 and 21. Again, Hammond discloses increasing depth of field. Hammond does not disclose "digitally processing the intermediate image to form a final image such that the optical element and the specially designed optical element combined yield a second depth of field that is less than the first depth of field." Since element (3) of claim 22 is not present, at least, Hammond does not anticipate claim 22. Applicant therefore requests reconsideration and withdrawal of the rejection of claim 22.

Claims 23-30, 32, 34 and 35 depend from claim 22 and thus benefit from like arguments; reconsideration and withdrawal of the rejection of claims 23-30, 32, 34 and 35 is therefore requested. However, there are other reasons for patentability of claims 23-30, 32, 34 and 35.

For example, claim 25 recites "disposing the specially designed optical element at an image of an exit pupil defined by the optical element." As noted with respect to claim 4, Hammond does not disclose an image of an exit pupil, much less positioning anything at such an image.

Claim 26 recites "disposing the specially designed optical element adjacent to an aperture stop defined by the optical element." As noted with respect to claim 5, Hammond does not disclose such placement of any optical elements.

Claim 27 recites "disposing the specially designed optical element at an image of an aperture stop defined by the optical element." As noted with respect to claim 6, Hammond does not disclose an image of an aperture stop.

Claim 30 recites "utilizing a random phase plate as the specially designed optical element," while claim 32 recites "utilizing a phase grating as the specially designed optical element." As noted with respect to claims 7 and 9, Hammond does not disclose a random phase plate or a phase grating.

Claim 29 recites "utilizing a diffractive element as the specially designed optical element." As noted with respect to claims 12 and 17, Hammond does not disclose a "diffractive element."

For at least the reasons cited above, Applicants request reconsideration and withdrawal of the rejection of claims 23-30, 32, 34 and 35 as anticipated by Hammond.

Applicants' claim 36, as amended, recites the following elements:

(1) an optical arrangement configured to form an intermediate image of an object, the optical arrangement including one or more optical elements and a specially designed optical element; and

(2) a digital processing arrangement configured to process the intermediate image to form (a) an in focus image of a first axial portion of the object and (b) an out of focus image of a second axial portion of the object.

Hammond does not disclose element (2) of claim 36. The Examiner recites a list of items within Hammond including what are allegedly an "optical arrangement," "optical elements," "specially designed optical element" and "digital processing arrangement," and then alleges that all of these things are "configured to process the intermediate image to form (a) an in focus image of a first axial portion of the object and (b) an out of focus image of a second axial portion of the object as described in column 6, lines 43-67 and column 7, lines 1-67 and column 8, lines 1-16." Office Action, page 6. Applicant disagrees and points out that Hammond does not disclose or suggest images of an "axial portion of the object," nor "an in focus image of a first axial portion of the object" and/or "an out of focus image of a second axial portion of the object." Such teachings are entirely absent within Hammond, particularly within the very lengthy passage the Examiner has cited.

For example, the only instance of the word "axial" within all of Hammond is: "During imaging, phase mask 24-1 operates in a known manner to cause the OTF of optical assembly 20-1 to remain approximately constant over a range of distances that extends in both axial directions from the location of optimum focus (i.e., towards and away from the lens)." Hammond, col. 7, lines 26-31. There is nothing in this passage that even suggests images of a first or second "axial portion" of an object. Similarly, all of the instances of the word "image" within the passage cited by the Examiner are (emphasis added):

> "...*image* sensor 30 for receiving the intermediate *image* formed by optical assembly 20 and converting that *image* into an intermediate *image* signal that, after A/D conversion, become a digital intermediate *image* signal which is made up of a plurality of discrete *image* data elements," Hammond, col. 6, lines 53-58.
>
> "the digital intermediate *image* signal...," Hammond, col. 6, lines 59-60.
>
> "a 1D *image* sensor 30-1...," Hammond, col. 7, line 1.
>
> "...when used with a 1D *image* sensor...," Hammond, col. 7, lines 17-18.
>
> "... the signal to noise ratio of the digital intermediate *image* signal," Hammond, col. 7, lines 44-45.
>
> "This amplitude mask has the effect of smoothing out the intermediate *image* PSF. This smoothing may be seen by comparing FIG. 7A, which shows the in-focus intermediate *image* PSF of a 1D optical assembly which has a 'hard aperture', and FIG. 7B, which shows the intermediate *image* PSF of an optical assembly such as that shown in FIG. 3A which includes a 1D Gaussian amplitude mask. Amplitude mask 26-1 that has a Gaussian characteristic provides the additional advantage that it causes the intermediate *image* PSF to have an envelope shape that does not change as much over a depth of focus as that of an optical system implemented without an amplitude mask." Hammond, col. 7, line 57 - col. 8, line 2.

Even with all of these references within Hammond to an "image" of some sort, there is no reference to images of a "first axial portion" or a "second axial portion" of an object.

Since Hammond does not disclose element (2) of claim 36, Hammond does not anticipate claim 36; Applicant therefore requests reconsideration and withdrawal of the rejection of claim 36.

Claim Rejections – 35 U.S.C. §103

The following is a quotation from the MPEP setting forth the three basic criteria that must be met to establish a *prima facie* case of obviousness.

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a

> reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP §2142, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claims 8, 16 and 31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hammond. Applicant respectfully disagrees.

First, each of claims 8, 16 and 31 depend directly or indirectly from claims 1 or 22, both of which are shown above to be patentable over art of record.

Second, claims 8 and 31 both recite "pseudo-random phase plates." The Examiner states that it is "well known in the diffractive art to utilize pseudo-random phase plates. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a pseudo-random phase plate in the imaging system of Hammond in order to provide for improved uniformity of the output beam." Office Action, page 7. Applicant contends that it is not "well known in the diffractive art to utilize pseudo-random phase plates" and requests that this finding be supported with adequate evidence pursuant to MPEP §2144.04(C). Additionally, the contention that such a phase plate would have been utilized "in order to provide for improved uniformity of the output beam" is inconsistent with the use of such phase plates in claims 8 and 31, thus no motivation to utilize a pseudo-random phase plate in combination of the elements allegedly taught by Hammond has been shown. The pseudo-random phase plate of claim 8 is for use as the specially designed optical element of claim 1; therefore, it is "designed to cooperate with the optical arrangement and the digital processor to define a second value of axial resolution that is greater than the first value." Claim 22 shows that a similar purpose is intended for the pseudo-random phase plate of claim 31. Indeed, neither the system of claim 1 as limited by claim 8, or the method of claim 22 as limited by claim 31, contains anything resembling an "output beam" that could benefit from "improved uniformity," as the Examiner alleges. Since the allegation of what would be "well known in the art" is not substantiated, and there is no suggestion or motivation to combine a pseudo-random phase plate with the prior art, *prima facie* obviousness is not present.

For all of the reasons cited above, Applicants request reconsideration and withdrawal of the rejection of claims 8, 16 and 31 as unpatentable over Hammond.

Allowable Subject Matter

Applicant thanks the Examiner for the indication of claim 33 as allowable subject matter if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, a new claim 37 has been added, rewritten with limitations of original claim 33 as well as claims 22 and 32, from which claim 33 depends. The features of claim 37 such as, for example, "an angle between the in-focus PSF and the out-of-focus PSF that is maximized in Hilbert space" are believed to be patentable over art of record. Therefore, it is respectfully submitted that new claim 37 overcomes the art of record, and the allowance of claim 37 is respectfully requested.

Conclusion

In view of the above Amendments and Remarks, Applicant has addressed all issues raised in the Office Action dated 23 February 2005, and respectfully solicits a Notice of Allowance. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

The fee of $510 for a three-month extension of time for a small entity and $100 for 1 extra independent claim and $25 for the extra claim fee is enclosed herewith. Applicant believes no other fees are currently due, however, if any fee is deemed necessary in connection with this Amendment and Response, please charge Deposit Account No. 12–0600.

Respectfully submitted,

LATHROP & GAGE L.C.

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